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LANGUAGE HABITS AND THE RECALL OF CONNECTED DISCOURSE.

BY- ROSENBERG, SHELDON
MICHIGAN UNIV., ANN ARBOR,CTR.FOR RES.LANG.AND BEH

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THIS ARTICLE CONTAINS A REVIEW OF RECENT RESEARCH ON THE RECALL OF ASSOCIATES EMBEDDED IN CONNECTED DISCOURSE AND A DISCUSSION OF THE THEORETICAL ASSUMPTIONS THAT GUIDED THE RESEARCH. EVIDENCE IS PRESENTED NOT ONLY FOR ASSOCIATIVE FACILITATION IN THE RECALL OF KEY WORDS BUT ALSO FOR A FACILITATING EFFECT OF ASSOCIATION UPON THE RECALL OF CONTEXT MATERIALS. IN ADDITION, SOME EVIDENCE IS PRESENTED WHICH SUGGESTS THAT ASSOCIATIVE FACILITATION IN THE RECALL OF KEY ITEMS DOES NOT DEPEND UPON OPPORTUNITIES FOR CONSTRUCTION DURING RECALL. THIS REPORT IS BASED ON A PAPER PRESENTED AT THE FIRST CONFERENCE ON LANGUAGE AND LANGUAGE BEHAVIOR, CENTER FOR RESEARCH ON LANGUAGE AND LANGUAGE BEHAVIOR, UNIVERSITY OF MICHIGAN, ANN ARBOR, MICHIGAN, OCTOBER 17-18, 1966. IT ALSO APPEARS IN "STUDIES IN LANGUAGE AND LANGUAGE BEHAVIOR, PROGRESS REPORT V," SEPTEMBER 1, 1967. (AUTHOR/AMM)

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Language Habits and the Recall of Connected Discourse[1, 2]

Sheldon Rosenberg
Center for Research on Language and Language Behavior
University of Michigan

This article contains a review of recent research on the recall of associates embedded in connected discourse and a discussion of the theoretical assumptions that guided the research. Evidence is presented not only for **associative** facilitation in the recall of key words but also for a facilitating effect of association upon the recall of context materials. In addition, some evidence is presented which suggests that associative facilitation in the recall of key items does not depend upon opportunities for construction during recall.

Evidence from developmental and linguistic studies (McNeill, in press; Chomsky, 1965) suggests that when we acquire a language, we acquire a system of phonological, syntactic (grammatical), and semantic habits (or implicit cognitive rules, as many psycholinguists would prefer to call them). This system of habits represents the basic linguistic competence that underlies our ability to speak and understand a language. This is by no means the entire story, however. Other language habits--some idiosyncratic, such as those that characterize individual differences in style, and some cultural, such as those that are revealed by word-frequency counts and word-association norms--are the result of experience in the use of a language. Habits of the latter type and non-linguistic variables, such as noise, the presence of appropriate objects in the environment, motivation, reinforcement, memory capacity and physical health, act as constraints upon the use of our basic linguistic competence in actual performance situations.

It should be clear, of course, that the term habit is being used here in the very general sense of input-output constraint, so as to include, for example, such phenomena as simple word-class dependencies (e.g., adjective-noun) and fundamental grammatical relations (e.g., subject-object, main verb) under the same concept.

One of the most interesting sources of constraint created by language habits is the result of the fact that they are hierarchically organized. The hierarchic structure of language habits is reflected in the dependency that exists between syntax and meaning. For example, the sentences John hit Mary and Mary hit John differ in meaning, and the difference between them can be seen to be the result of a difference in word order. In sentences of this

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type, word order is a fundamental, syntactic cue to the identification of subject-object relations. A detailed discussion of the relationship between syntax and meaning can be found in Katz and Postal (1964).

A few examples will suffice to indicate the interest that is developing in the study of the role of language habits in verbal learning and verbal behavior. Underwood (1965) has reviewed some of the work on the role of language habits in traditional studies of rote verbal learning, and Miller (1962) has reviewed some of the early work on grammatical structure as a variable in language processing. Miller and Isard (1963) have demonstrated the importance of syntactic and semantic constraints in sentence perception. Similarly, Marks and Miller (1964) have shown the importance of syntactic and semantic constraints in sentence memorization. Their findings with respect to the effects of syntactic habit, were confirmed by Rosenberg (1966d), who found, in addition, that sentences that contain associatively-related words (as determined from free-association norms) are easier to recall than sentences that contain associatively-unrelated words. Mehler (1963) has reported that transformed declarative sentences are more difficult to memorize than active declarative sentences, but his findings have been questioned by the results of research by Martin and Roberts (1966) who used a different measure of sentence complexity.

Johnson (1965) raised the question of the "psychological reality" of linguistic phrase structure rules and used a sentence-learning task to evaluate it. He reasoned that if in processing a sentence the words are recoded into noun- and verb-phrase units, the probability of making a transitional error (TE) between phrases (the probability of making an error on a word, given the preceding word in a sentence is correct) should be greater than the probability of a TE within phrases. His data supported the hypothesis. Other data presented by Johnson, and the results of a subsequent study (Johnson, 1966) led him to conclude that his results could not be accounted for in terms of differential intra- and inter-phrase associative constraints between the words in his sentences. He established an association between an adjective and a noun (within phrase) and between a noun and a verb (between phrase) prior to the learning of sentences that contained these adjective-noun and noun-verb transitions. Rosenberg (1967) argued, however, that Johnson's failure to find a significant effect of associative habit upon the probability of a TE at the phrase boundary may have resulted from the fact that the associations Johnson established in

the laboratory were not as strong as the natural-language associations revealed by word-association norms. The results of Rosenberg's study confirmed his expectations: the probability of a TE between phrases was greater than the probability of a TE within phrases only when the between-phrase transition was marked by a weak associative constraint. Controlled association norms were used by Rosenberg to vary associative strength. The results of Rosenberg's study suggested further that the presence of strong associative constraints between all of the words in a sentence makes it possible to process such sentences in units larger than the phrase.

From Johnson's and Rosenberg's research it is possible to conclude that phrase structure and associative habits interact with each other in determining the way in which the words in a sentence will be organized for recall. What is interesting about this conclusion is that it emphasizes the fact that language habits are organized on several levels of linguistic structure simultaneously.

While interest in the role of language habits at the level of the sentence is growing, psychologists have generally neglected the problem of connected discourse. The only consistent work in the area has been on the effects of approximation to the statistical structure of English (e.g., Miller & Selfridge, 1950; Lachman & Tuttle, 1965) upon the recall of passages. From a structural standpoint, connected discourse should arouse all of the habits that are aroused by sentence structure, but, in addition, such factors as serial organization of sentences, pronominalization and equivalence chains (Harris, 1952) should arouse habits that extend beyond the sentence. The term "equivalence chains" refers, among other things, to the presence of identical items in different sentences in a discourse. Recent research by Koen, Becker and Young (1967) has been concerned with identification of the cues that Ss use in discriminating paragraphs from nonparagraphs, and thus will be useful in identifying factors that arouse extra-sentence habits.

In an attempt to gain some understanding of the role of language habits in the recall of connected discourse, we have undertaken a series of investigations of the recall of associatively-related words embedded in connected discourse, some of which have already been completed (Rosenberg, 1966b, 1966c, in press). The method used in most of these studies can best be described with reference to an example. The following two narratives--a high-association passage and a low-association passage--are modified versions of passages used previously.

High-Association Passage

It was a Sunday afternoon in March and the air was clear and brisk. The (man) walked to the corner to meet the woman who was looking at a boy and a girl across the way. After exchanging a few words, they went to a restaurant, and as they entered, they passed someone who was examining a (table), a chair and a desk, and someone with a cloth. After they ordered, there was time to look at a newspaper, where there was a story about a (king) and a queen. It concerned a ruler who had just been given a new crown. There was also a story about a (priest) whose church was in difficulty, which went on to discuss God and religion. The front page contained an item about a (lion) that had a fight with a tiger in a zoo, and had its mane pulled. It also contained an article on (justice), law and peace written by a former judge. Their order arrived, and everything was good: the (cheese), the bread, the crackers and the milk. After they finished, they headed toward a (city) which was located near a town on the other side of the state. The country they passed through on the way was nice. When they arrived, they went directly to a (house) where a home used to be. They had to check up on the roof and the garage. There was a (river) nearby, and the water was visible on a clear day. A lake and a stream were nearby also. The caretaker was outside with a (hammer) and a nail. A tool of some sort and a saw were on the ground. There were some (shoes) on the grass, and there was dirt on the fellow's feet. His socks and laces were discolored. Someone had left a (needle), some thread, a pin and his sewing about, and there were some (kittens), cats, dogs and mice outside, as well. It grew late and they decided to leave.

Low-Association Passage

It was a Sunday afternoon in March, and the air was clear and brisk. The (man) walked to the corner to meet the guest who was looking at a horse and a bird across the way. After exchanging a few words, they went to a restaurant, and as they entered, they passed someone who was examining a (table), a door and a post, and someone with a glass. After they ordered, there was time to look at a newspaper, where there was a story about a (king) and a nurse. It concerned a leader who had just been given a new plane. There was also a story about a (priest) whose friend was in difficulty, which went on to discuss life and industry. The front page contained an item about a (lion) that had a fight with a hound in a pit and had its fuzz pulled. It also contained an article on (justice), age and doubt, written by a former sailor. Their order arrived, and everything was good: the (cheese), the corn, the lettuce and the fish. After

they finished, they headed toward a (city) which was located near a road on the other side of the valley. The region they passed through on the way was nice. When they arrived, they went directly to a (house) where a store used to be. They had to check up on the gate and the plaster. There was a (river) nearby, and the forest was visible on a clear day. A grave and a station were nearby also. The caretaker was outside with a (hammer) and a bell. A stem of some sort and a pan were on the ground. There were some (shoes) on the grass, and there was dirt on the fellow's porch. His wrists and knees were discolored. Someone had left a (needle), some metal, a hat and his violin about, and there were some (kittens), guns, rocks and oars outside as well. It grew late and they decided to leave.

Each passage contains the same context materials and the same series of stimulus words selected from free-association norms (e.g., Palermo & Jenkins, 1964). The high-association passage contains response words that were selected from the top of the associative hierarchies of the stimulus words, while the low-association passage contains response words that were selected from the bottom of the associative hierarchies for the stimulus words. For the reader's convenience, the stimulus words have been placed in parentheses, and the response words have been underlined. There are three response words for each stimulus word, and, in all instances, the response words are the items that follow the items in parentheses. In general, high- and low-association responses are comparable in length, in grammatical class and in Thorndike-Lorge (1944) frequency. In addition, an attempt was made to avoid semantic anomaly in the selection of low-association items. It can be seen, however, that from the standpoint of style and good English, the passages are awkward in places. This situation was made necessary by the need to control the variables that traditional studies of rote verbal learning have demonstrated to be of importance.

In a typical study, one group of Ss is exposed to the high-association passage and another group to the low-association passage. There is only one exposure, and it is followed immediately by a written recall test.

An important part of the studies that have been conducted thus far was to collect "cloze" data on the passages from Ss who had not participated in the recall studies. In the cloze task, the stimulus words, the response words, or both were deleted from the passages, and the Ss' task was to try to guess the missing words on the basis of the remaining context. The cloze data were collected to reveal something of the strength of association between the stimulus

and response words within the context of the passages, and also to reveal something of the strength of association between the context and the critical stimulus and response words, so as to avoid the situation in which high-association or low-association items are favored by constraints from the context. As an additional check upon the effect of context, list-learning recall data were collected on the critical stimulus and response words.

It was anticipated that associatively-related words would be recalled better than associatively-unrelated words. The rationale for this expectation was based not only upon the results of research on the role of associations in learning word lists (Deese, 1959) and word pairs (Rosenberg, 1965), but upon assumptions such as the following as well:

1. In decoding language materials, we tend to anticipate subsequent items, with the items anticipated being, in part, a function of associative constraints created by words that have already been decoded. For example, if we encounter man in decoding a discourse and anticipate woman, and woman actually occurs later on in the discourse, then woman has, theoretically, occurred twice instead of once. This "frequency" hypothesis predicts that recall of high-strength associates should be superior to recall of low-strength associates.

2. Miller (1956) has made us aware of the importance of "linguistic recoding" in verbal learning and verbal behavior, a phenomenon which has been studied extensively in the verbal learning laboratory (e.g., Rosenberg, 1966a). One of the implications of this notion is that associatively-related words occurring in connected discourse should to a certain extent be recoded into chunks. For associatively-related items, then, the unit of memory in a recall task would be the chunk, whereas in the case of associatively-unrelated items, the unit of memory would be the word. In the sort of task that we are concerned with here, of course, the result of linguistic recoding would be a difference in recall in favor of high-association items.

3. If we fail to recall a word from a passage during a recall test, we are likely to try to guess at it. According to the "construction" hypothesis, our guessing behavior under such circumstances is likely to be influenced, in part, by associative constraints created by the items that have already been recalled. The recall scores of Ss exposed to a high-association passage, therefore, could be enhanced by construction during recall.

The following conclusions were suggested by the results of the studies that have been conducted thus far:

1. Groups of associatively-related words embedded in connected discourse tend to be recalled better than groups of associatively-unrelated words.

2. A word, such as king, occurring in connected discourse, is more likely to be recalled if it is accompanied by high-strength associates (e.g., queen, ruler, crown) than if it is accompanied by low-strength associates (e.g., nurse, leader, plane). This finding may have resulted from the fact that associative bidirectionality was the rule for most of the materials used in these studies. It remains to be seen whether this finding of mutual facilitation extends to associatively-asymmetrical word groups.

3. The results of three out of four studies suggest that the probability of recalling a word from a group of associatively-related items, given that other words from the group have also been recalled, is greater than the probability of recalling a word from a group of associatively-unrelated items under the same circumstances. The term recall dependency appears to describe this phenomenon.

4. If a word is deleted from connected discourse, the probability of constructing it correctly (cloze test) is greater if the discourse contains a strong associate of that word than if the discourse contains a weak associate of that word. In general, associative facilitation in construction was found to be bidirectional.

These, then, were the major findings of our work on the role of associations in the recall of items embedded in connected discourse. After these studies were completed, however, it was hypothesized (Rosenberg, in press) that the presence of associatively-related words in a passage might make the passage a more integrated unit. The result would be a higher level of recall of context content words from the high-association passages than from the low-association passages. Another way to account for such a finding, of course, would be to assume that in learning a passage, new associations are established between items, the result being that one item can act as a cue to the recall of another item. The more cues present during recall, the greater the likelihood of recall of other items from the passage. Since more associatively-related words are recalled from passages than associatively-unrelated words, more context content words should be recalled from high-association passages than from low-association passages. This hypothesis was confirmed by data from four studies (Rosenberg, in press).

There are a number of questions still to be answered concerning the role of associative habit in the recall of connected discourse. Perhaps the most

interesting of these is the question of the source of facilitation in the recall of associates. Theory suggests that high-association items are not only stored more efficiently than low-asociation items, but are more likely to be constructed during recall, especially when the recall is written and the S has his production before him as he attempts to come up with additional items. At present, we are attempting to evaluate the hypothesis that the superior recall of high-association items does not depend upon opportunities for construction. In other words, even though construction may contribute something to the recall of associates, storage variables, such as "frequency" and "linguistic recoding," should be sufficient to produce a significant difference in favor of associatively-related materials.

This hypothesis is being evaluated through the use of a recognition-memory task which reduces greatly the likelihood of construction. Briefly, the critical stimulus and response words are taken out of the context of the passages and randomized within a long list of distracters. After a passage has been exposed for learning in the usual manner, this test list is presented as a paced successive binary recognition task. Preliminary results with passages that contained 16 pairs of key items suggest that the superiority in the recall of associatively-related word-pairs does not depend upon the presence of opportunities for construction.

Another interesting problem is created by the fact that in the learning of connected discourse, performance is heavily constrained by serial organization. It is possible, therefore, that the associative facilitation we have found has been the result of the fact that associatively-related words always occurred contiguously, i.e., in the same or in adjacent sentences. At present an attempt is being made to construct passages in which associatively-related words do not occur in the same or in adjacent sentences. It is anticipated that this manipulation will result--at least in the case of recall--in a condition of associative interference.

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Footnotes

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